

AMENDMENTS TO THE CLAIMS

The listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

1. *(Currently Amended)* A polymer ~~Polymer~~ energy absorber for motor vehicles, ~~characterized in that the energy absorber consists of comprising: polymer material in the form of a polymer tube; and~~
~~comprises a number of chip removing elements and that the chip removing elements are arranged peripherally, so as to be form fitting and material to material, around a central opening in a metal base plate with having a flange and defining an opening, the metal base plate including a plurality of chip removing elements arranged around the opening, wherein the chip removing elements and that the arrangement encloses are arranged to contact a surface of the polymer tube of polymer material frictionally adhering, thereby causing to provide for the absorption of energy through chip removal in longitudinal direction of of a portion of the polymer tube surface during a crash.~~

2. *(Currently Amended)* The polymer ~~Polymer~~ energy absorber for motor vehicles as defined in claim 1, ~~characterized in that tubes wherein the polymer tube is made from thermoplastic or duroplastic material are used which are adapted to the motor vehicle weight and the vehicle type.~~

3. *(Currently Amended)* The polymer ~~Polymer~~ energy absorber for motor vehicles as defined in claim 1, ~~characterized in that wherein the energy absorber polymer tube of polymer material is composed of one of the materials selected from the group consisting of polyvinyl chlorides (PVC), polyethylenes (PE), polypropylenes (PP), polyamides (PA), polycarbonates (PC), polyethyleneterephthalates (PET), polybutylene-terephthalates (PBT), polymethylmethacrylates (PMMA), polyoxymethylenes (POM), styrene copolymerisates, [[([)]acryl-nitrile-styrene-butadien copolymer (ABS), [[and]] copolymer from styrene and acrylonitrile([)]], as well as and blends thereof (ABS/PC and PBT/PC).~~

4. **(Currently Amended)** ~~The polymer~~ Polymer energy absorber for motor vehicles as defined in claim 1, ~~characterized in that wherein the energy absorber polymer tube of polymer material~~ is composed of a high-performance polymer material selected from the group consisting of polyetherketones (PEK, PEEK), polyamides (PA) and their copolymers thereof.

5. **(Currently Amended)** ~~The polymer~~ Polymer energy absorber for motor vehicles as defined in claim 1, ~~characterized in that wherein~~ polymer blends are used as material for the ~~tube-shaped energy absorber of polymer tube material.~~

6. **(Currently Amended)** ~~The polymer~~ Polymer energy absorber for motor vehicles as defined in claim 3, ~~characterized by the wherein the polymer tube further comprises an admixture of inorganic filler materials selected from the group consisting of such as~~ chalk, talcum, carbon fibers, glass fibers, mica, silicates, aluminum nitrite, ~~[[and]]~~ aluminum silicate and metal micro-particles, for improving the mechanical stability and rigidity of the ~~energy absorber tube of polymer tube material.~~

7. **(Currently Amended)** ~~The polymer~~ Polymer energy absorber for motor vehicles as defined in claim 6, ~~characterized in that the share of added wherein the inorganic filler materials~~ ~~[[is]]~~ are present in the range of 3 to 40 percent ~~percentages~~ by weight, relative to the mol weight of the ~~energy absorber tube of polymer tube material.~~

8. **(Currently Amended)** ~~The polymer~~ Polymer energy absorber for motor vehicles as defined in claim 3, ~~characterized by wherein the polymer tube further comprises an admixture of nano-particle filler materials selected from the group consisting of such as~~ TiO₂, soot, silicic acid and clay minerals, the nano-particle filler materials having with particle sizes of 80-150 nm, at a share of 3-15 percent ~~percentages~~ by weight, relative to the mol weight of the polymer ~~energy absorber tube.~~

9. **(Currently Amended)** The polymer ~~Polymer~~ energy absorber for motor vehicles as defined in claim 1, ~~characterized in that the~~ wherein an outer tube diameter of ~~[[a]]~~ the polymer energy absorber tube is in the range of 4 to 10cm.

10. **(Currently Amended)** The polymer ~~Polymer~~ energy absorber for motor vehicles as defined in claim 1, ~~characterized in that the~~ wherein a tube wall thickness of ~~[[a]]~~ the polymer energy absorber tube ranges from 0.5 to 10cm ~~(corresponding to solid material strength)~~.

11. **(Currently Amended)** The polymer ~~Polymer~~ energy absorber for motor vehicles as defined in claim 1, ~~characterized in that the~~ wherein a total length of ~~[[a]]~~ the polymer energy absorber tube ranges from 35 to 200 mm, ~~depending on the design~~ for an energy absorption in the range of up to 20 kJ.

12. **(Currently Amended)** The polymer ~~Polymer~~ energy absorber for motor vehicles as defined in claim 11, ~~characterized in that~~ wherein the total length of ~~[[a]]~~ the polymer energy absorber tube preferably ranges from 100-170mm and ~~depends~~ depending on the space provided for ~~[[the]]~~ installation in ~~[[a]]~~ the motor vehicle, ~~[[on]]~~ the amount of energy ~~energies~~ to be absorbed, and ~~[[on]]~~ the dimensioning for a crash speed range of up to 20 km/h.

13. **(Currently Amended)** The polymer ~~Polymer~~ energy absorber for motor vehicles as defined in claim 1, ~~characterized in that~~ wherein the polymer energy absorber tube is ~~composed of~~ comprises at least two layers of the same and/or different layer thickness and of identical and/or different polymer materials.

14. **(Currently Amended)** The polymer ~~Polymer~~ energy absorber for motor vehicles as defined in claim 2 ~~[[1]]~~, ~~characterized in that the~~ wherein a density of the thermoplastic and/or duroplastic materials used for the multi-layer composition of the polymer energy absorber is in the range of 0.82 to 1.48 g/cm³.

15. **(Currently Amended)** The polymer ~~Polymer~~ energy absorber for motor vehicles as defined in claim 13, ~~characterized by wherein the polymer tube further comprises~~ a metal inlay and/or a textile reinforcement ~~that is deposited over the complete or partial substrate for a multi-layer composition, so as to improve~~ ~~[[the]]~~ shearing force resistance.

16. **(Currently Amended)** The polymer ~~Polymer~~ energy absorber for motor vehicles as defined in claim 13, ~~characterized in that wherein the polymer tube further comprises~~ a tubular basic body of metal ~~[[is]]~~ coated with the at least two layers and ~~that the deposited polymer layers~~ form ~~[[the]]~~ energy-absorbing chip-removal layers.

17. **(Currently Amended)** The polymer ~~Polymer~~ energy absorber for motor vehicles as defined in claim 1, ~~characterized in that the~~ wherein a geometric cross-sectional shape of the ~~energy absorber polymer tube is one of either~~ circular, U-shaped, trapezoid, rectangular or elliptical.

18. **(Currently Amended)** The polymer ~~Polymer~~ energy absorber for motor vehicles as defined in claim 1, ~~characterized in that a~~ wherein the polymer ~~energy absorber tube is~~ produced using an ~~[[the]]~~ extrusion, co-extrusion and/or injection-molding technique.

19. **(Currently Amended)** The polymer ~~Polymer~~ energy absorber for motor vehicles as defined in claim 1, ~~characterized in that the~~ wherein energy absorption through material removal is achieved for crash speeds of up to 20 km/h in a longitudinal direction of the ~~energy absorber polymer tube surface by means of a number~~ due to the plurality of chip-removing elements which are connected frictionally ~~adhering~~ to the polymer tube surface.

20. **(Currently Amended)** The polymer ~~Polymer~~ energy absorber for motor vehicles as defined in claim 1, ~~characterized in that by adjusting wherein the number, [[the]] geometric form~~ cross-sectional shape, and a ~~[[the]]~~ cutting depth ~~(penetration depth)~~ of the chip-removing elements, ~~the~~ are adjustable to alter the amount of energy absorption ~~can be adjusted for up to 20 kJ.~~

21. *(Currently Amended)* The polymer ~~Polymer~~ energy absorber for motor vehicles as defined in claim 1, ~~characterized in that~~ wherein the chip-removing elements are adapted to have an energy-absorbing effect while moving along one or more of an ~~[[the]]~~ inside surface of the polymer tube and an outside surface of the polymer tube ~~or in a combination arrangement the outside and inside surface of the polymer tube.~~

22. *(Currently Amended)* The polymer ~~Polymer~~ energy absorber for motor vehicles as defined in claim 19, ~~characterized in that~~ wherein the number of chip-removing elements ranges from 4 to 40.

23. *(Currently Amended)* The polymer ~~Polymer~~ energy absorber for motor vehicles as defined in claim 22, ~~characterized by~~ wherein the number of ~~8 to 16~~ chip-removing elements is 8 to 16~~[[,]]~~ arranged symmetrically and equidistant about the metal base plate opening as well as peripherally.

24. *(Currently Amended)* The polymer ~~Polymer~~ energy absorber for motor vehicles as defined in claim 22, ~~characterized in that the~~ wherein spacing between ~~[[the]]~~ individual chip-removing elements is in the range of 2.5 to 25%, relative to an outside and/or inside periphery of the polymer ~~energy absorber tube.~~

25. *(Currently Amended)* The polymer ~~Polymer~~ energy absorber for motor vehicles as defined in claim 1, ~~characterized in that~~ wherein the chip-removing elements have a rectangular, triangular, trapezoid, polygonal, or semi-circular shape and form a chip-removing angle of 45-90 degrees~~[[,]]~~ relative to the normal of an outside and/or inside surface of ~~[[for]]~~ the polymer ~~energy absorber tube outside and/or inside surface.~~

26. *(Currently Amended)* The polymer ~~Polymer~~ energy absorber for motor vehicles as defined in claim 1, ~~characterized in that the~~ wherein a length of a chip-removing element ~~[[2b]]~~ is 0.5-3cm, ~~adapted to~~ depending on a ~~[[the]]~~ wall thickness of the polymer ~~energy absorber tube and results in a material penetration depth Δd of 0.15 to 1.5 cm.~~

27. **(Currently Amended)** ~~The polymer~~ Polymer energy absorber for motor vehicles as defined in claim 1, ~~characterized in that wherein~~ metal, or metal alloys, or ceramics are used as material for the chip-removing elements.

28. **(Currently Amended)** ~~The polymer~~ Polymer energy absorber for motor vehicles as defined in claim 1, ~~characterized in that~~ further comprising a guide sleeve [[5 is]] attached integrally to the metal base plate ~~2 with flange, thus permitting to permit~~ an axially guided movement of the polymer tube ~~energy absorber~~, and that ~~wherein~~ the guide sleeve [[5]] functions as momentary support in case of a crash.

29. **(Previously Presented)** A bumper system for motor vehicles, comprising at least two polymer energy absorbers as defined in claim 1.

30. **(Currently Amended)** The bumper system for motor vehicles as defined in claim 29, ~~characterized in that wherein~~ the polymer energy absorbers are installed in front of a vehicle frame side rail, and that ~~wherein~~ the polymer ~~energy absorber~~ tubes are integrally connected to a bumper support ~~form locking and/or frictionally adhering by means of fastening elements~~ and the flange of the metal base plate ~~for the energy absorber is connected to a vehicle frame part by fastening elements that is positioned behind.~~

31. **(Currently Amended)** The bumper system for motor vehicles as defined in claim 29, ~~characterized in that wherein~~ the energy absorber is connected integrally to a [[the]] bumper support in a ~~and that this connection to the bumper support is form-locking and material-to-material or form-locking and frictionally adhering~~ manner.

32. **(Currently Amended)** The bumper system for motor vehicles as defined in claim 29, ~~characterized in that wherein~~ the bumper system is disposed [[used]] in a [[the]] rear region of the [[a]] motor vehicle.

33. **(New)** An energy absorber for a motor vehicle, comprising:
- a first element; and
 - a second element defining an opening arranged to receive the first element and including a plurality of chip-removing elements protruding within the opening, wherein the chip-removing elements are arranged to contact a surface of the first element and remove a portion of the surface to absorb energy when the first element is moved relative to the second element in a longitudinal direction during a crash of the motor vehicle.